

Chapter 28MATH 200

② If $y = x^{\sin(x)}$, find $\frac{dy}{dx}$.

$$\ln(y) = \ln(x^{\sin(x)})$$

$$\ln(y) = \sin(x) \ln(x)$$

$$\frac{d}{dx} [\ln(y)] = \frac{d}{dx} [\sin(x) \ln(x)]$$

$$\frac{1}{y} \frac{dy}{dx} = \cos(x) \ln(x) + \sin(x) \frac{1}{x}$$

$$\frac{dy}{dx} = y \left(\cos(x) \ln(x) + \frac{\sin(x)}{x} \right)$$

$$\boxed{\frac{dy}{dx} = x^{\sin(x)} \left(\cos(x) \ln(x) + \frac{\sin(x)}{x} \right)}$$